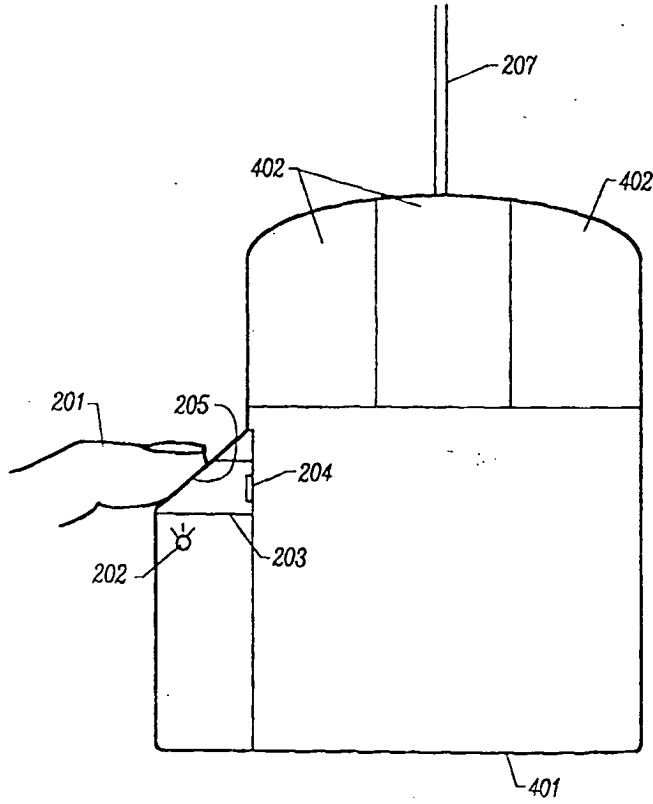


## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<b>(51) International Patent Classification <sup>6</sup> :</b>  <b>G06K 9/00</b>	<b>A3</b>	<b>(11) International Publication Number:</b> <b>WO 98/11501</b>  <b>(43) International Publication Date:</b> 19 March 1998 (19.03.98)
<b>(21) International Application Number:</b> PCT/US97/16092  <b>(22) International Filing Date:</b> 10 September 1997 (10.09.97)  <b>(30) Priority Data:</b> 60/025,949 11 September 1996 (11.09.96) US 08/925,524 8 September 1997 (08.09.97) US  <b>(71)(72) Applicants and Inventors:</b> RAO, D., Ramesh, K. [GB/US]; 357 - 6th Avenue #5, Menlo Park, CA 94025 (US). SUBBIAH, Subramanian [IN/US]; 1326 Spruce Street #2306, Philadelphia, PA 19107 (US). LI, Yang [CN/US]; 2065 California Street #7, Mountain View, CA 94040 (US).  <b>(72) Inventor; and</b> <b>(75) Inventor/Applicant (for US only):</b> CHU, Donna [US/US]; 1326 Spruce Street #2308, Philadelphia, PA 19107 (US).  <b>(74) Agents:</b> HICKMAN, Paul, L. et al.; Hickman Beyer & Weaver, LLP, P.O. Box 61059, Palo Alto, CA 94306 (US).		<b>(81) Designated States:</b> AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ARIPO patent (GH, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).  <b>Published</b> <i>With international search report.</i>  <b>(88) Date of publication of the international search report:</b> 14 May 1998 (14.05.98)
<b>(54) Title:</b> EMBEDDABLE MODULE FOR FINGERPRINT CAPTURE AND MATCHING		
<b>(57) Abstract</b>  Disclosed is a low-cost fingerprint capture device that can be integrated in a computer mouse. Fingerprint information captured with such a device is transmitted to a computer via a serial port. As such ports are relatively slow, the capture device provides a low resolution fingerprint image (having less than 512 x 512 pixels). This low resolution data is processed by an iterative method that contrasts sectors of the image in a direction specified by "flow vectors". These flow vectors specify an average direction of fingerprint ridgelines in the sector under consideration. These methodologies enable the transmission of fingerprint data over the relatively slow RS232 serial protocol, in a manner that allows virtually instantaneous fingerprint identification.		
		

# INTERNATIONAL SEARCH REPORT

onal Application No

PCT/US 97/16092

**A. CLASSIFICATION OF SUBJECT MATTER**  
IPC 6 G06K9/00

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)  
IPC 6 G06K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	PATENT ABSTRACTS OF JAPAN vol. 016, no. 361 (P-1396), 5 August 1992 & JP 04 111038 A (NEC IC MICROCOMPUT SYST LTD), 13 April 1992; see abstract ---	1-13
A	IBM TECH. DISCLOSURE BULLETIN, vol. 17, no. 3, August 1974, pages 773-774, XP002047332 J E GAFFNEY, JR: "Fingerprint Pattern Offset Determination and Matching Method" see the whole document ---	1
A	EP 0 348 182 A (FUJITSU LTD) 27 December 1989 see column 7, line 49 - line 59 see column 8, line 33 - line 43 --- -/-	2,9,10

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

\* Special categories of cited documents :

- \*A\* document defining the general state of the art which is not considered to be of particular relevance
- \*E\* earlier document but published on or after the international filing date
- \*L\* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- \*O\* document referring to an oral disclosure, use, exhibition or other means
- \*P\* document published prior to the international filing date but later than the priority date claimed

- \*T\* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- \*X\* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- \*Y\* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- \*Z\* document member of the same patent family

Date of the actual completion of the international search

18 November 1997

Date of mailing of the international search report

11.03.98

Name and mailing address of the ISA

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Authorized officer

GRANGER, B

# INTERNATIONAL SEARCH REPORT

ational application No.

PCT/US 97/ 16092

## Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:  
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. ☐ Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

## Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

See annexed sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1-13

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

# INTERNATIONAL SEARCH REPORT

information on patent family members

International Application No

PCT/US 97/16092

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